GEORGIA INSTITUTE OF TECHNOLOGY — OFFICE OF CONTRACT ADMINISTRATION

PROJECT ADMINISTRATION DATA SHEET

[x] ORIGINAL [ ] REVISION NO. _____

Project No. A-3561 GTRI/~~GIT~~ DATE 6 / 21 / 83

Project Director: John L. Brown ~~School~~/Lab EMSL

Sponsor: NUSAC, Inc.

Type Agreement: Purchase Order No. 83-159

Award Period: From 5-6-83 To 7-31-83 (Performance) _____ (Reports)

Sponsor Amount:	This Change	Total to Date
Estimated:	$	$
Funded:	$ 1,876	$ 1,876 *

Cost Sharing Amount: $ _____ Cost Sharing No: _____

Title: Ceramographic Examination

ADMINISTRATIVE DATA OCA Contact Frank H. Huff x4820

1) Sponsor Technical Contact:

J. E. Mikolajczak
NUSAC, Inc.
1850 Samuel Morse Drive
Reston, VA 22090
(703) 471-0900

2) Sponsor Admin/Contractual Matters:

same as 1)

Defense Priority Rating: _____ Military Security Classification: _____

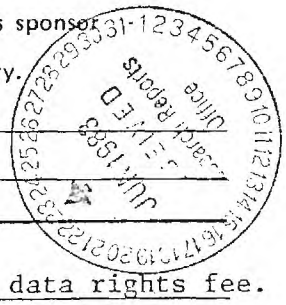
(or) Company/Industrial Proprietary: see below** ~~X~~

RESTRICTIONS

See Attached none Supplemental Information Sheet for Additional Requirements.

Travel: Foreign travel must have prior approval – Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of $500 or 125% of approved proposal budget category.

Equipment: Title vests with N/A



COMMENTS:

* Project budget is $1,376; the remaining $500 is for a patent and data rights fee.

** Non-Disclosure agreement negotiated relative to results of metallographic analysis. Obligation continues for five years from 6-1-83.

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FORM OCA 4-393

GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

SB 407

Date November 1, 1983

Project No. A-3561 ~~School~~/Lab EMSL

Includes Subproject No.(s) _____

Project Director(s) John L. Brown GTRI / ~~GIT~~

Sponsor NUSAC, Inc.

Title Ceramographic Examination.

Effective Completion Date: 7/31/83 (Performance) 7/31/83 (Reports)

Grant/Contract Closeout Actions Remaining:

- [ ] None
- [x] Final Invoice or Final Fiscal Report
- [ ] Closing Documents
- [x] Final Report of Inventions
- [ ] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [ ] Other _____

Continues Project No. _____ Continued by Project No. _____

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Form OCA 60:1028

ENGINEERING EXPERIMENT STATION
Georgia Institute of Technology
A Unit of the University System of Georgia
Atlanta, Georgia 30332

July 8, 1983

Final Report

Mr. Joe Mikolajczak
NUSAC Inc.
1850 Samuel Morse Drive
Reston, Virginia 22091

Reference Project A3561 Your P.O. No. 83-159

Dear Mr. Mikolajczak:

Analysis has been completed on the three nuclear reactor fuel pellets submitted to us for examination. The samples were identified as follows:

Tray No. 4600
2.90% U^{235}

Tray No. 5067
2.90% U^{235}

Tray No. 6512
2.90% U^{235}

Each pellet was cylindrical and approximately 1/2 inch long by 3/8 inch diameter. They were sectioned transversely and one half of each sample mounted together in a single castoglas resin block. The transverse section was wet ground using 220,320, 400 and 600 silicon carbide abrasive papers. Prepolishing was done with 400 grit on canvas and final polishing with 0.05 micron alumina on felt.

Macrographs of each cross section were made at 8X. Samples 6512 and 5067 appear similar but sample 4600 appears to have slightly more porosity.

The samples were etched using a solution of 90% H_2O_2 and 10% H_2SO_4. Micrographs were made at 250X to show grain size. The original polaroid micrographs were given to Mr. Will Smith during his visit. A set of 8X10 prints used to measure grain size is included with this report.

Grain size was determined by randomly applying a fixed length test line and counting the grain boundary intercepts. Results were as follows:

Tray No.	4600	13.34 microns
Tray No.	5067	15.42 microns
Tray No.	6612	14.34 microns

After etching the samples were stained by immersing for 3 1/2 minutes in an aqueous solution containing 15% H_2O_2. This treatment shows UO_2 rich areas as light blue and free gadolinia appears as white crystals. UO_2 was readily evident in all samples but no free gadolinia was seen. Two color micrographs at 250X were made of each sample and are included with this report.

An attempt to visualize the gadolinia distribution in the samples using the SEM with energy dispersive X-ray analysis was not successful due to the detection limits of the equipment.

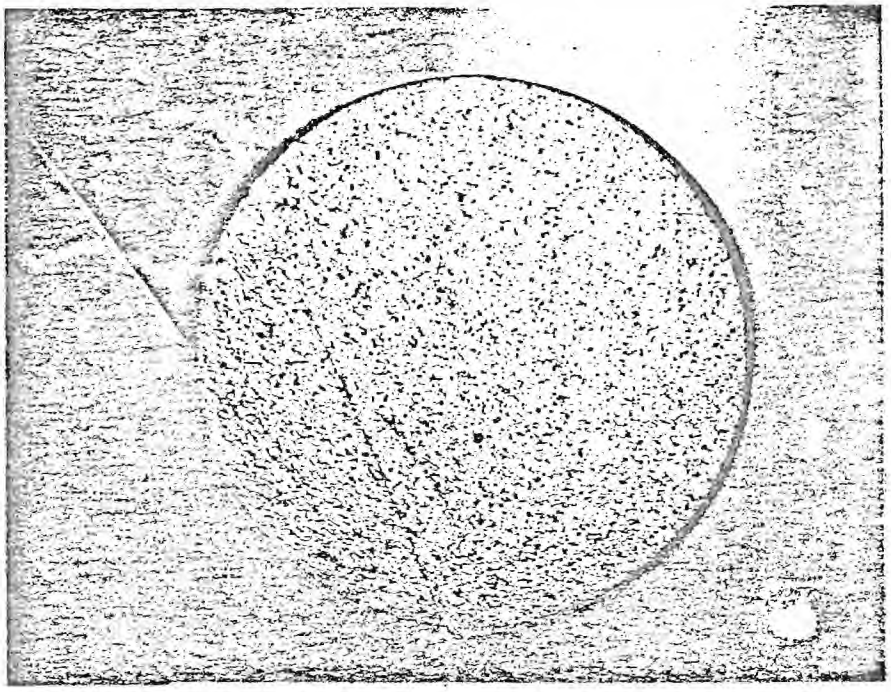
If you have further questions please let me know.

Very truly yours,

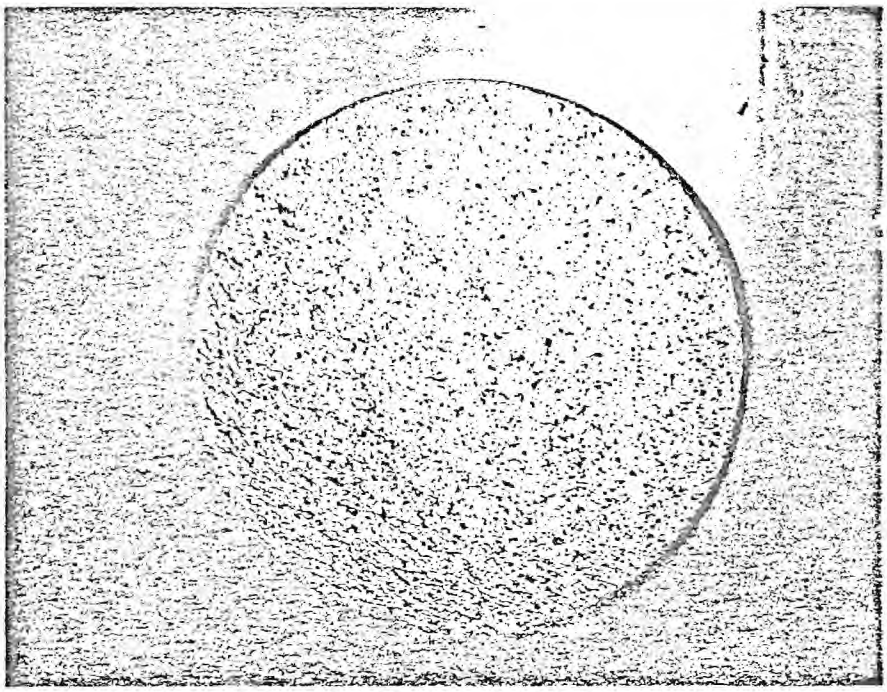
John L. Brown, Head
Materials Characterizazion Branch

cns

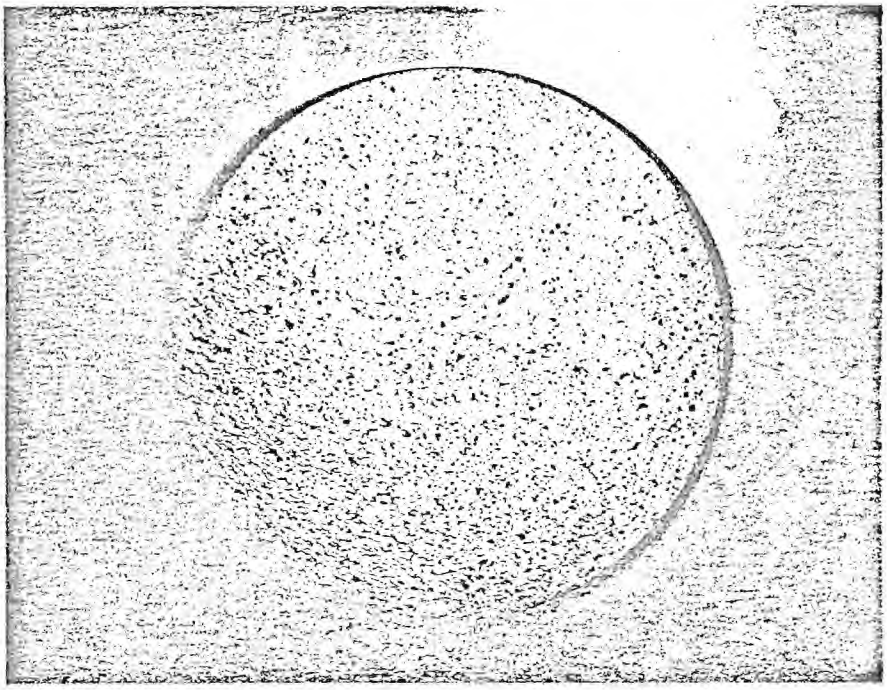
Enclosures



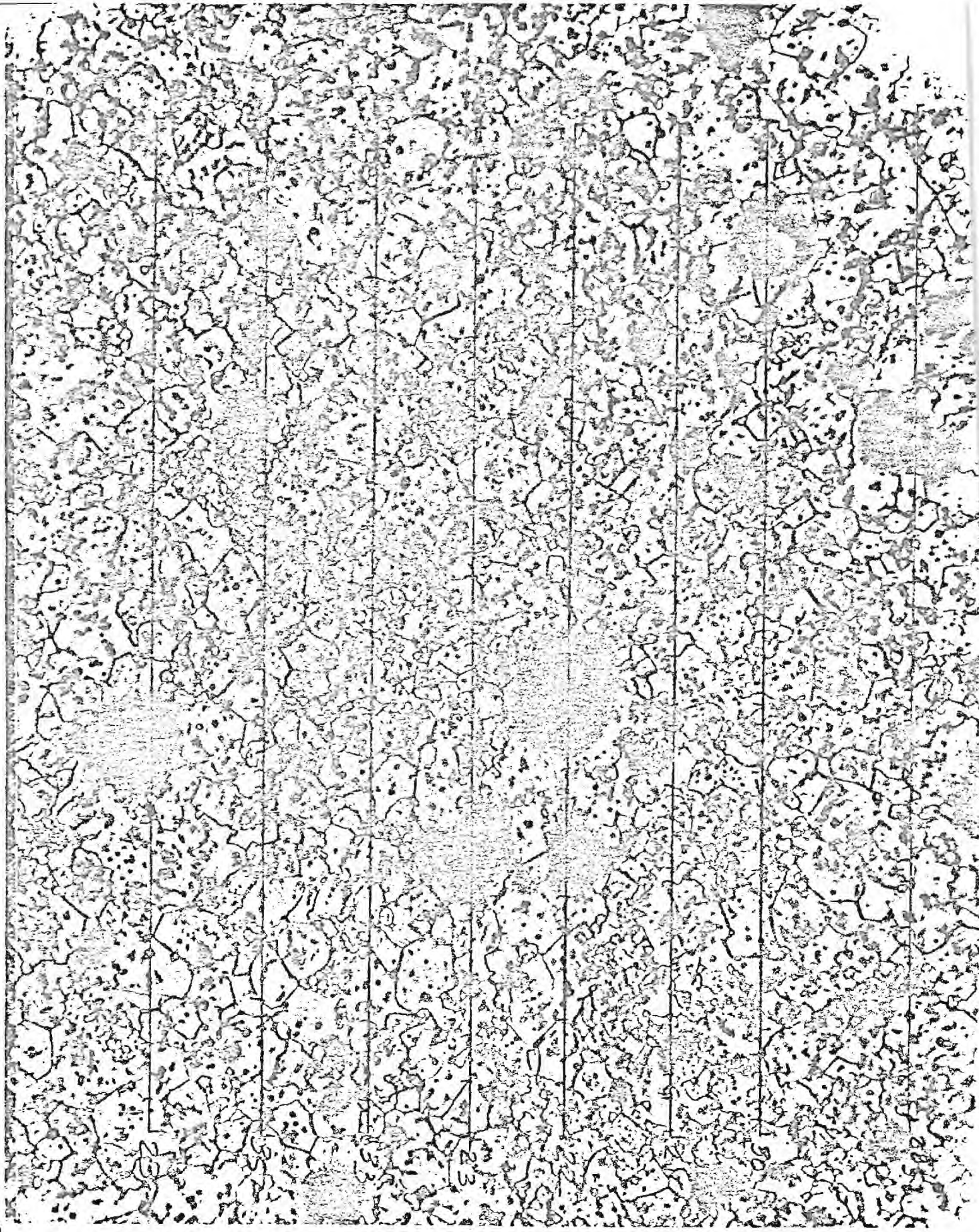
TRAY 4600
as polished
8X



TRAY 5067
as polished
8X

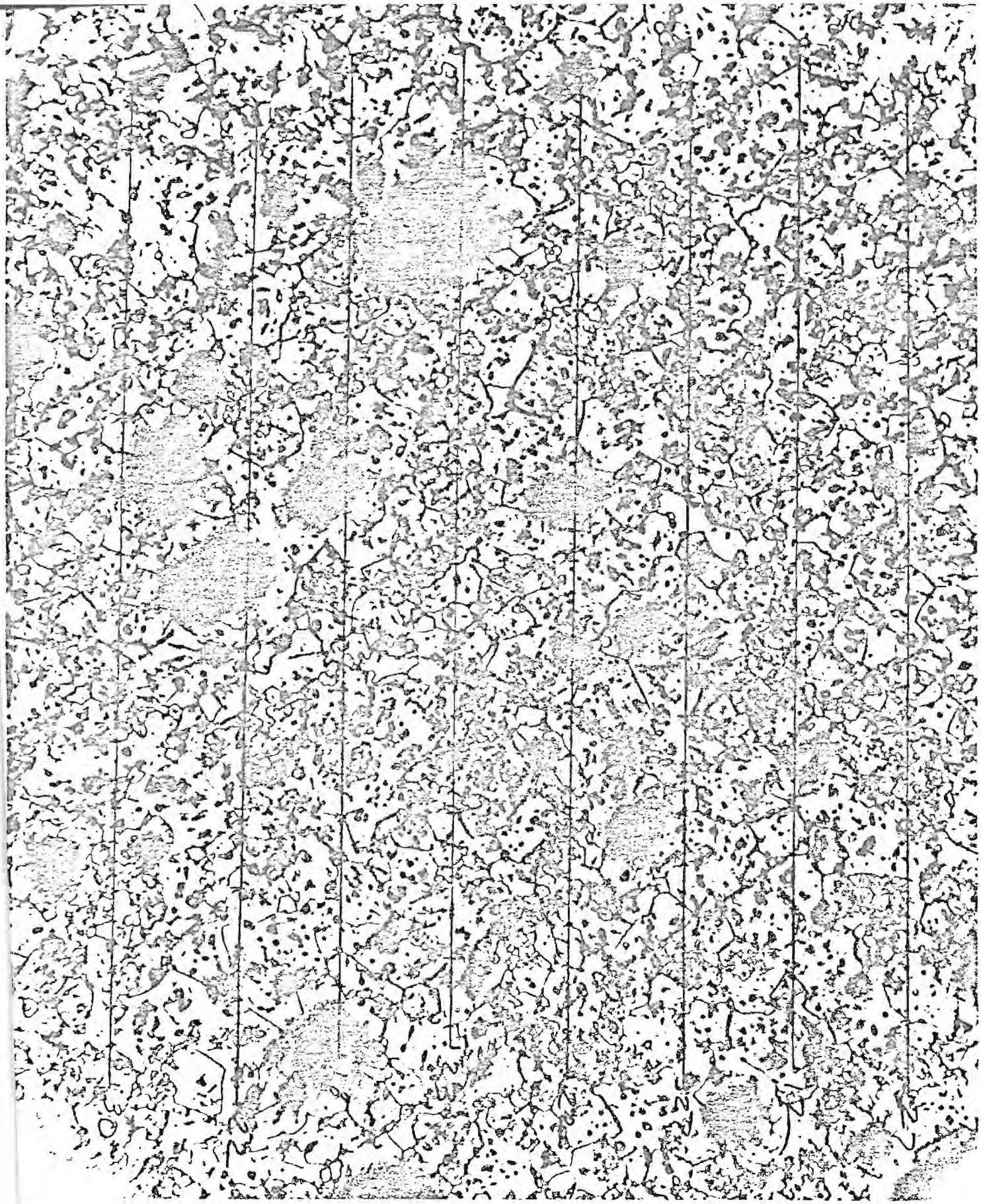


TRAY 6512
as polished
8X



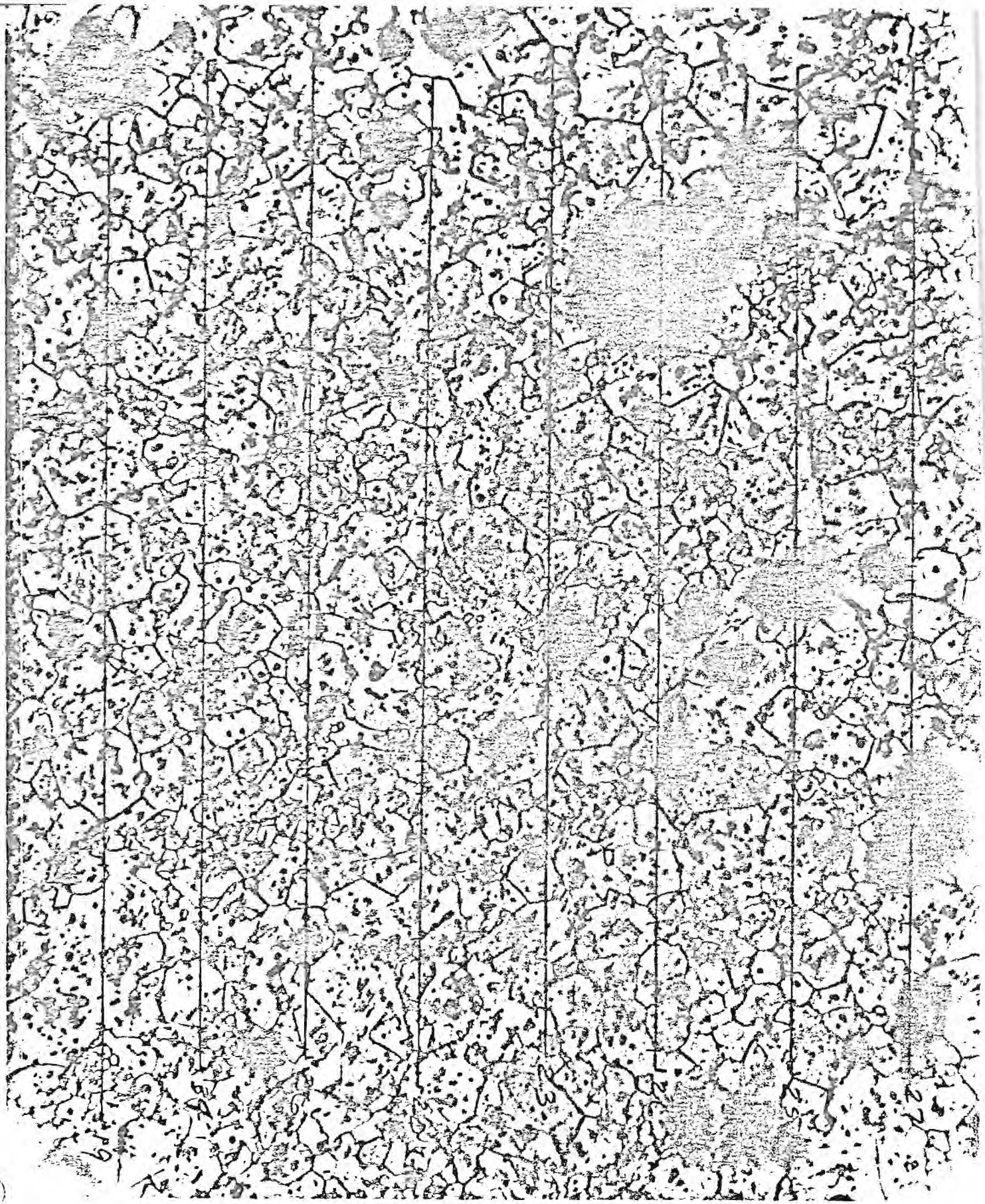
TRAY 4600
etched

558X



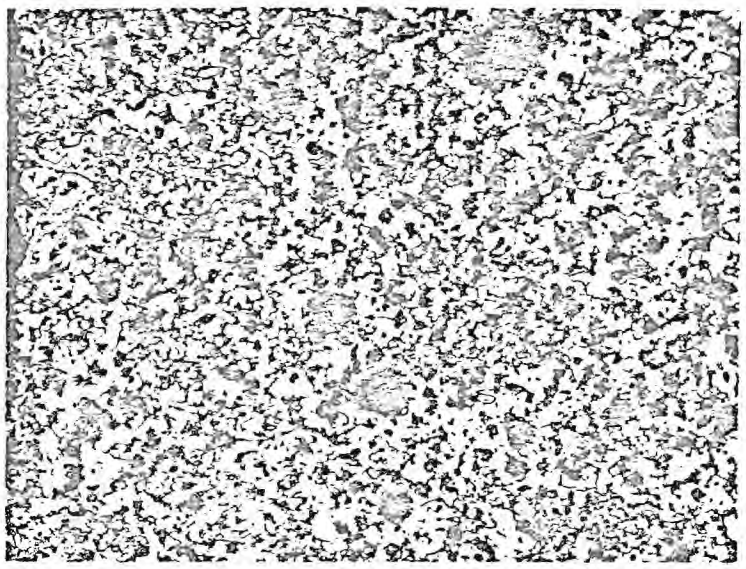
TRAY 5067
etched

558X



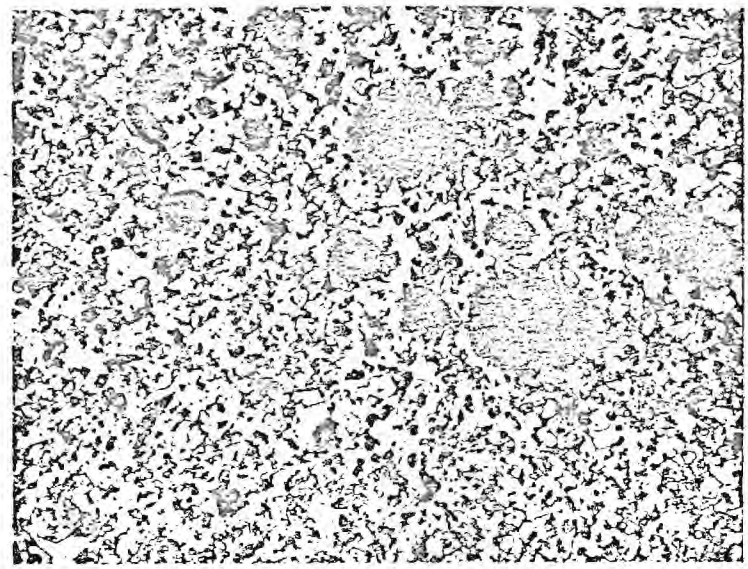
TRAY 6512
etched

558X



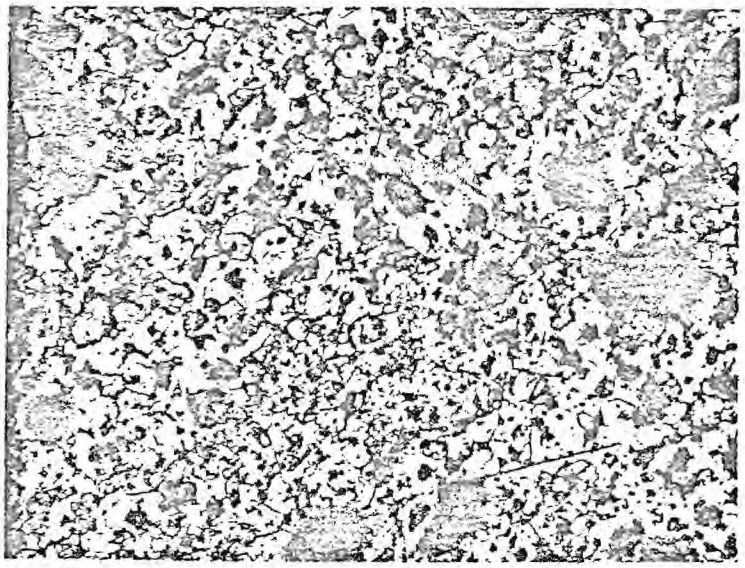
TRAY 4600
stained

250X

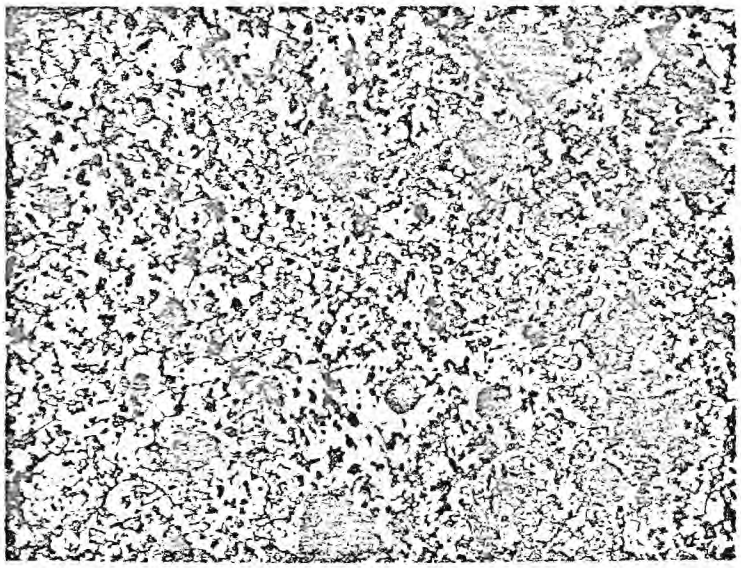


TRAY 4600
stained

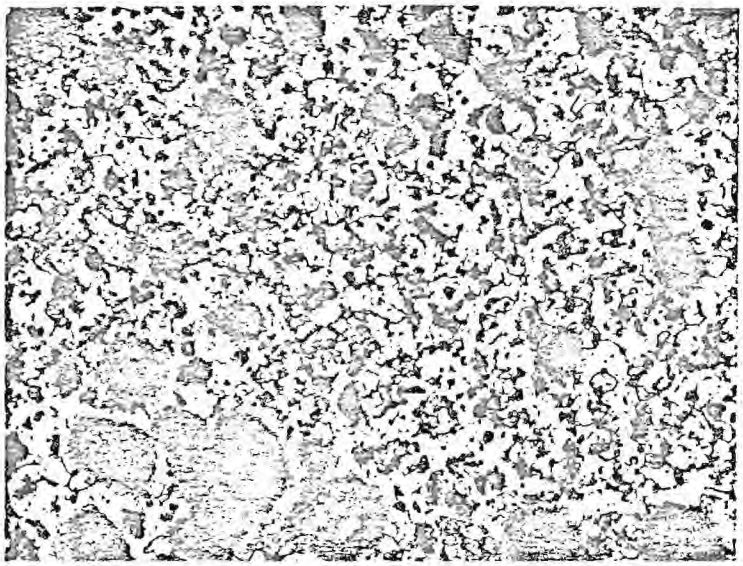
250X



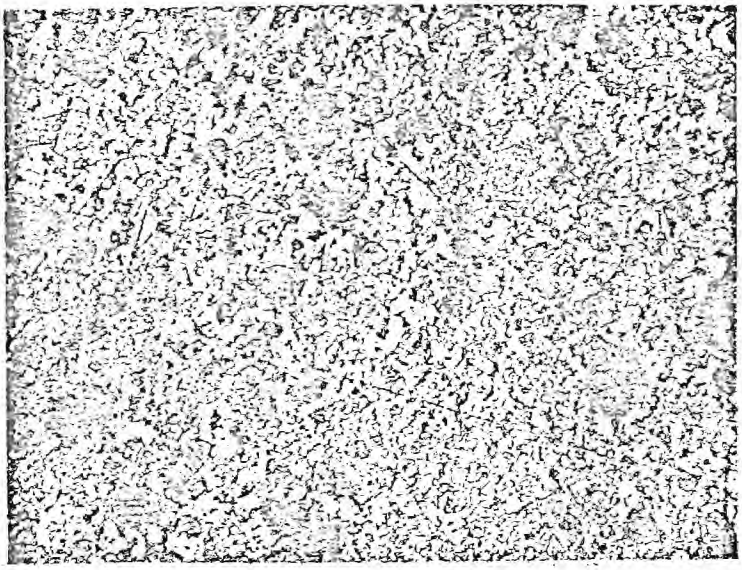
TRAY 5067
stained
250X



TRAY 5067
stained
250X



TRAY 6512
stained
250X



TRAY 6512
stained
250X